

Annexure-I

IV Semester Syllabi

Automobile Engineering

Sr. No.	Course Code	Course Name	L	T	P	Credits
1	EN3BS03	Engineering Mathematics-III	3	1	0	4
2	AU3CO07	Machine Design-I	3	0	2	4
3	AU3CO08	Fluid Mechanics	3	1	2	5
4	AU3CO09	Automotive Electricals & Electronics	3	0	2	4
5	AU3CO10	Automotive Transmission	3	0	2	4
6	EN3MC03	Technical Communication	2	0	0	0
7	EN3HS04	Fundamentals of Management, Economics & Accountancy	3	0	0	3
		Total	20	2	8	24
		Total Contact Hours	30			

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3BS03	Engineering Mathematics-III	3	1	0	4

Unit I

Functions of Complex Variables: Functions of complex variables: Analytic functions, Harmonic Conjugate functions, Cauchy-Riemann Equations, Complex Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles and Residues, Residue Theorem, Application of Residue theorem for evaluation of real integrals.

Unit II

Numerical Analysis –I : Errors and Approximations, Solution of Algebraic & Trancendental Equations (Regula Falsi method , Newton-Raphson formula and Iterative method), Solution of Simultaneous linear equations by Gauss Elimination, Gauss Jordan, Crout's Triangularization method , Jacobi's and Gauss-Siedel Iterative method.

Unit III

Numerical Analysis –II: Difference Operators, Interpolation (Newton Forward and Backward Formulae), Central Interpolation Formulae (Gauss, Bessel's and Sterling's formula), Lagrange's and Divided difference formulae, Numerical Differentiation.

Unit IV

Numerical Analysis –III : Numerical Integration, Numerical Solution of Ordinary Differential Equations (Taylor's Series, Picard's Method, Euler's Modified Method, Runge-Kutta Method, Milne's Predictor and Corrector method) .

Unit V

Statistics : Correlation, Karl Pearson's Coefficient of Correlation, Spearman's Rank Correlation Coefficient , Linear Regression, Regression coefficients ,Curve fitting (Method of Least Square), Testing of Hypothesis , Student's t-test, Fisher's z-test, Chi-Square test.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
2. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw Hill Publishing Company Ltd.

References

1. J. Ravichandran, Probability and Statistics, Wiley India.
2. R. George, Mathematical Statistics, Springer.
3. M. K. Jain, Iyengar and R. K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publication.

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO07	Machine Design-I	3	0	2	4

Unit I

Design against Static & Fluctuating loads: Types of static loads, Theories of failure, design under static load, Stress concentration and its effect on ductile and brittle materials, stress concentration factor for various geometries, cyclic stresses, notch sensitivity, design for finite and infinite life, Soderberg, Goodman & Gerber criteria.

Unit II

Keys & Couplings: Keys; Types and selection, design of square and flat keys, splines. Selection of couplings, design of rigid coupling: Muff coupling, Clamp coupling and Flange coupling, Flexible couplings: Bushed pin flexible coupling.

Unit III

Shafts: Cause of failure in shaft, materials for shaft, stress in shaft and design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments.

Unit IV

Mechanical Spring: Types, nomenclature of helical springs, spring materials, types of ends, design of helical springs subjected to static load. Leaf springs: types, classification, nomenclature and design.

Unit V

Belt Rope and Chain drives: Design of belt drives, Flat & V-belt drives, Condition for Transmission of max. Power, Selection of belt, design of rope drives and design of chain drives with sprockets.

Text Books:

1. V. B. Bhandari, Design of Machine Elements, TMH Publishing Co. Ltd., New Delhi
2. Joseph E. Shigley, Machine Design, McGraw hill
3. P. C. Sharma and D. K. Agrawal, Machine Design, Kataria Publishers.

Reference Books:

1. Robert L. Norton, Machine Design, Prentice Hall
2. M.F.Spotts, Design of Machine Elements, Pearson.

Web Sources:

1. <http://nptel.ac.in/downloads/112105125/>
2. <http://www.svecw.edu.in/Docs%5CMEDMMLnotes2013.pdf>

Suggested Practicals:

1. To study and draw the methods of reducing stress concentration.
2. Design and drawing of different types of keys.
3. Design and drawing of Muff coupling.
4. Design and drawing of Clamp coupling.
5. Design and drawing of Flange coupling.
6. Design of shafts subjected to combined twisting and bending moments & drawing of bending and twisting moment diagrams.
7. Design and drawing of different types of springs.
8. Design and drawing of different types of chains.
9. Design and drawing of different types of belts.
10. Design and drawing of different types of wire ropes.

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Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO08/FT3CO08	Fluid Mechanics	3	1	2	5

Unit-I

Fluid Properties and Hydrostatics: Density – Viscosity – Surface tension – compressibility – capillarity – Hydrostatic forces on plane – inclined and curved surfaces – buoyancy – centre of buoyancy – metacentre.

Unit-II

Kinematics of Flow: Types of flow-ideal & real, steady & unsteady, uniform & nonuniform, one, two and three dimensional flow, path lines, streak-lines, streamlines and stream tubes; continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flow netstheir utility & method of drawing flow nets.

Unit-III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow; momentum correction factor. The moment of momentum equation, forces on fixed and moving vanes and other applications. Fluid Measurements: Velocity measurement (Pitot tube, Prandtl tube, current meters etc.); flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturi-meter, weirs and notches).

Unit-IV

Dimensional Analysis and Dynamic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pi theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc.)

Unit-V

Laminar Flow: Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, Stokes law, lubrication principles. Flow through pipes, Boundary Layer

Text Books:

1. P.N.Modi & S.M.Seth, Hydraulics and Fluid Mechanics, Standard Book House.
2. Russell C. Hibbeler, Fluid Mechanics, Pearson.
3. Yunus Cengal, Fluid Mechanics, TMH.

Reference Books:

1. Frank .M. White, Fluid Mechanics, TMH
2. S.C. Gupta, Fluid Mechanics and Hydraulic Machines, Pearson.
3. Jnik Dake, Essential of Engg Hyd., Afrikan Network & Sc Instt. (ANSTI)

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Web Sources:

1. <https://lecturenotes.in/subject/240/fluid-mechanics-fm>
2. <https://arxiv.org/ftp/arxiv/papers/1407/1407.3162.pdf>

Suggested Practicals:

1. To determine the local point pressure with the help of pitot tube.
2. To Study terminal velocity of a spherical body in water.
3. Calibration of Orifice meter and Venturi meter
4. Determination of C_c , C_v , C_d of Orifices
5. Calibration of Nozzle meter and Mouth Piece
6. Reynolds experiment for demonstration of stream lines & turbulent flow
7. Determination of meta-centric height
8. Determination of Friction Factor of a pipe
9. Verification of Impulse momentum principle.



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO09	Automotive Electricals and Electronics	3	0	2	4

Unit I

Batteries: Principles and construction of lead-acid battery. Characteristics of battery, rating capacity and efficiency of batteries. Various tests on battery condition, charging methods. Constructional aspect of alkaline battery, Battery Maintenance

Unit II

Starting, Charging Systems: Condition at starting, Series motor and its characteristics. Principle & construction of starter motor, Starter Switches. **Charging System:** Generation of electricity (DC and AC), Voltage & current regulation techniques, types.

Unit III

Lighting Systems & Accessories: Insulated & earth return systems. Positive & negative earth systems. Details of head light & side light. Headlight dazzling & preventive methods. Electrical fuel-pump, Speedometer, Fuel, oil & temperature gauges, Horn, Wiper system, Trafficator.

Unit IV

Sensors and Actuators: Basic sensor arrangement, Types of sensors such as-Oxygen sensors, Crank angle position sensors-Fuel metering/vehicle speed sensor and detonation sensor-Altitude sensor, flow sensor. Throttle position sensors. Solenoids, stepper motors, and relays. **Vehicle control systems:** Anti-locking braking system, steer by wire, cruise control system.

Unit V

Electronic Fuel Injection And Ignition Systems: Introduction, feedback carburettor systems. Throttle body injection and multi-port or point fuel injection., fuel injection systems, Injection system controls. Advantages of electronic ignition systems: Types of solid-state ignition systems and their principle of operation, Contact less electronic ignition system, and electronic spark timing control.

Text Books:

1. P.L. Kholi, Automotive Electrical Equipment, Tata McGraw-Hill.
2. W.H.Crouse, Automobile Electrical Equipment, McGraw Hill.
3. Robert Bosch, Automotive Hand Book, Bently Publishers.

Reference Books:

1. A.W. Judge, Modern Electrical Equipment of Automobiles, Chapman & Hall, London.
2. A.P. Young. & L.Griffiths, Automobile Electrical Equipment, English Language Book Society & New Press.
3. G.W. Vinal, Storage Batteries, John Wiley & Sons Inc.

Web Sources:

1. http://fmcet.in/AUTO/AT6502_uw.pdf
2. <http://npkauto.com/wp-content/uploads/notes/third/6g/autotronics/CHAPTER%20NO%201%20AUTOMOTIVE%20ELECTRONIC%20COMPONENTS.pdf>

Suggested Practicals:

1. Study of batteries and battery maintenance.
2. Study of starting systems.
3. Study of Charging Systems.
4. Study of various current and Voltage regulation systems.
5. Study of various ignition systems.
6. Study of automobile electrical wiring.
7. Study of Antilock Braking System.
8. Study of dash-board indicators.
9. Study of automotive sensors.
10. Study of electronic fuel injection systems.
11. Study of lighting systems



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
AU3CO10	Automotive Transmission	3	0	2	4

Unit I

Clutch: Principle of operation, Constructional details, calculation of torque capacity, axial force. Different types of clutches, Operation of single plate helical spring, diaphragm type, and multiplate clutch, Centrifugal and Automatic Clutch, Dry and Wet type of clutch, Friction lining materials. Over-running clutch. Modes of operating a clutch – mechanical, hydraulic and electric, clutch maintenance.

Unit II

Gear Box: Objective of the Gear Box, Determination of gear ratios for vehicles, Performance characteristics in different speeds, Different types of gear boxes – sliding, constant and synchromesh type, Planetary gear box, need for double declutching and working of synchronizing unit. Power and economy modes in gearbox, Transfer box, Transaxles, Overdrives. Gear shifting mechanisms, mechanical link and wire types, Gear box maintenance.

Unit III

Hydrostatic Drive And Electric Drive: Hydrostatic drive – principle, types, advantages, limitations – Comparison of hydrostatic drive with hydrodynamic drive - Construction and working of typical Janny hydrostatic drive. Electric drive, Principle of early and modified Ward Leonard Control system, Advantage & limitations, Performance characteristics, Study of drive system in an electric and hybrid vehicle.

Unit IV

Drive Line and Hydrodynamic Drive : Propeller Shaft, U Joint , Front and Rear Drive, Differential , Fluid coupling, Principle of operation, Constructional details, Torque capacity, Performance characteristics, Reduction of drag torque, Torque Converter-Principle of operation, constructional details, performance characteristics, Converter coupling – Construction - Free wheel –Characteristic performance

Unit V

Automatic Transmission Applications: Chevrolet "Turbo glide" Transmission, Power glide Transmission Toyota "ECT-i" Automatic Transmission with Intelligent Electronic controls system, Hydraulic Actuation system.

Text Books:

1. W.H.Crouse & D.L.Anglin, Automotive Transmission and Power Trains construct, McGraw-Hill.
2. A.W. Judge, Modern Transmission systems, Chapman and Hall Ltd.
3. P. S. Gill, Automobile Engineering Vol-II, S. K. Kataria & Sons.

Reference Books:

1. Heinz Heisler, Advanced Vehicle Technology, Butterworth Heinemann.
2. Hydrostatic Transmission for vehicle applications, I. Mech E. Conference.
3. P.M.Heldt, Torque converters, Chilton Book Co.

Web Sources:

1. <http://164.100.133.129:81/eCONTENT/Uploads/MAS-5%20Manual%20and%20Automatic%20Transmissions.pdf>

Suggested Practicals:

1. Study of transmission of front and rear engine vehicles.
2. Study of front and rear-wheel-drive vehicle.
3. Study of four wheel-drive vehicles.
4. Study of various gear boxes and pre-synchronization systems.
5. Study of fluid couplings, hydrodynamic drives and torque converters.
6. Automatic transmission system study.
7. Electric drive vehicle study.
8. Study of different types of clutch.
9. Study the various types of gear used in automotive application.
10. Study the function of deferential and final drive.



Subject Code	Subject Name	Hours per Week			Total
		L	T	P	Credits
EN3HS04	Fundamentals of Management, Economics and Accountancy	3	0	0	3

Unit I: Concepts of Management

Definition, characteristics and importance of management; Management: Science or Art, Difference between Management and Administration, Levels of management, Functions of Management, Managerial Roles, Managerial skills and competencies; Decision Making: Definition, process and types; Decision making under certainty, uncertainty and risk; Cross cultural issues in management and challenges.

Unit II: Fundamentals of Marketing and Human Resource Management

Introduction to Marketing: Definition, importance, function and scope of marketing, Core concepts of marketing, Marketing concepts and orientations, Marketing environment, Marketing-mix, Holistic marketing concept, Customer Relationship Management (CRM).

Introduction to Human Resource Management (HRM): Nature, Scope, Objectives and Functions; Role of HR manager, Process and need for Human Resource Planning, Human resource policies, Changing role of Human Resource in India, Globalization and its impact on Human Resource.

Unit III: Fundamentals of Economics

Introduction to Economics: Definition, nature, scope and significance; Difference between micro and macro economics; Time value of money, Law of diminishing marginal utility; Theory of Demand and Supply, Price elasticity of demand; Meaning and types of costs, Law of variable proportions; Types of market structure; National income and related aggregates; Meaning and types of Inflation; Meaning and phases of business cycle.

Unit IV: Basic Accounting Principles

Accounting Principles and Procedure, Double entry system, Journal, Ledger, Trail Balance, Cash Book; Preparation of Trading, Profit and Loss Account; Balance sheet; Cost Accounting: Introduction, Classification of costs, Methods and Techniques of costing, Cost sheet and preparation of cost sheet; Breakeven Analysis: Meaning and its application.

Unit V: Fundamentals of Financial Management

Introduction of Business Finance: Meaning, Definition of Financial Management, Goals of Financial Management (Profit Maximization and Wealth Maximization), Modern approaches to Financial Management – (Investment Decision, Financing Decision and Dividend Policy Decisions).

Text Books

1. R. D. Agarwal, "Organization and Management", McGraw Hill Education.
2. P. C. Tripathy and P. N. Reddy, "Fundamentals of Management, Economics and Accountancy", Tata McGraw Hill
3. Kotler Philip and Keller Kevin Lane, "Marketing Management", Pearson

Reference Books

1. Peter F Drucker, "The Practice of Management", McGraw Hill
2. Harold Koontz, "Essentials for Management", Tata McGraw Hill
3. M Y Khan and P K Jain, "Management Accounting", Tata McGraw Hill

Website Link

1. <https://nptel.ac.in/courses/122108038/> (Management Concepts)
2. <https://nptel.ac.in/courses/110104068/> (Marketing)
3. www.hrmguide.net (Human Resource Management)
4. <http://economicsconcepts.com> (Economics)
5. <https://nptel.ac.in/courses/110101003/> (Accounting)
6. <https://nptel.ac.in/courses/105103023/39> (Financial Management)



Course Code	Course Name	Hours per Week			Total
		L	T	P	Credits
EN3MC03	Technical Communication	2	0	0	0

Unit I Communication: Difference between general and Technical Communication, Barriers to Communication, Verbal/ Non Verbal Communication, Body language , flow, patterns, types of communication.

Unit II Confidence Building : Self evaluation and development, SWOT Analysis, overcoming hesitation and fear of facing public, exercises for confidence building, concepts and elements of emotional intelligence, significance.

Unit III Business Correspondence – Business letters, formats, parts and layouts of business letters. sales letters: job applications, resume writing, applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit IV Report Writing – Business letters, formats, parts and layouts of business letters. sales letters: job applications, resume writing, applications, calling quotations, sending quotation, placing orders, complaints, and aftermath. Email Etiquettes.

Unit V Formal Presentation- Organising data, assimilating, preparing slides, designing presentations, basic personality traits. Interviews, group discussion

Text Books:

1. R C Sharma, Krishna Mohan, Business Correspondance and Report Writing .
2. M Ashraf Rizvi, Effective Technical Communication

Reference Books:

1. P N Kharu, Varinder Gandhi Communication Skills in English
2. Herta A Murphy, Effective Business Communication

Web Source:

<http://study.com/academy/lesson/communication-skills-definition-examples.html>
<https://books.google.co.in/books?>

Open Learning Source:

<https://onlinecourses.nptel.ac.in>